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COMMONWEALTH PHYTOPATHOLOGICAL NEWS

A QUARTERLY REVIEW OF NEWS AND VIEWS ISSUED BY THE COMMONWEALTH MYCOLOGICAL INSTITUTE, KEW, SURREY

THE GENUS *XANTHOMONAS*

by D. W. Dye, Plant Diseases Division
D. S. I. R., New Zealand

Dowson (1939) created the genus Xanthomonas and defined it as follows:- "Non-sporing, rod-shaped bacteria. Gram-negative, motile by one polar flagellum (rarely 2 present), or non-motile, yellow in the mass on nutrient agar and on sterile potato, on both of which abundant slimy growths are formed. Most species digest starch and produce acid in lactose; none produces acid in salicin."

Dowson (1957) improved this definition by deleting non-motility and by changing nutrient agar to nutrient glucose agar. Dowson did not make pathogenicity for plants a condition of the genus but he included only phytopathogenic species: no non-pathogens have subsequently been added (Bergey 1957). There are, however, a number of saprophytic yellow-pigmented organisms found in nature, particularly on plant surfaces and in the soil, which can fulfil the conditions of Dowson's (1957) definition. Proposals to include such organisms in the genus could be made.

Yellow Pigmented Forms

The writer has during the last two years been making a study of the genus and has compared cultures of 40 recognised xanthomonad species with a number of yellow-pigmented saprophytic organisms. It has been found that the phytopathogenic xanthomonads form a well-defined remarkably uniform group from which other yellow-pigmented, Gram-negative, monotrichous, aerobic, non-sporing organisms can be distinguished in the laboratory with little difficulty. Since the phytopathogenic xanthomonads are a uniform and economically important group it is considered that the genus should be defined so that it includes only these organisms. It is necessary that xanthomonads be distinguished from non-xanthomonads without recourse to plant inoculation since many laboratories do not have the facilities for adequately testing the pathogenicity of organisms. It is also essential that avirulent cultures of xanthomonads can be classified. As a result of information obtained in this investigation, a number of other characters which aid the identification of xanthomonads could be added to Dowson's (1957) definition. This information will be published elsewhere.

Burkholder (1948) stated that "unequivocal identification of xanthomonads by laboratory methods is as yet an impossibility." There has been no change in this position in recent years (Stapp 1956, Bergey 1957) and in the above-mentioned study also, it was not found possible to differentiate the species by laboratory tests. The variations in the cultural, physiological, and biochemical characters

of the xanthomonads did not appear to be correlated or to be associated with the isolates from particular hosts; they were frequently detected among the cultures derived from a single host plant. For these reasons they do not provide any obvious basis on which the group may be subdivided. There have been some attempts made to clarify the genus by serological methods and although the work has not been extensive or detailed yet it, too, reveals a close relationship between many species (Sharp 1927; Link & Link 1928; Elrod & Braun 1947 a and b). At present there is insufficient evidence to establish a taxonomy incorporating the serological characteristics of xanthomonads.

The diagnosis of Xanthomonas species, therefore, depends solely on the host specificity claimed for the various organisms, and since the host ranges of the species have never been completely determined the validity of the classification remains to be established. It may be noted that the practice of forming a species solely on the basis of the host of the original isolation is commonly unsatisfactory. It fails to identify avirulent strains or to make easy the recognition of organisms isolated from various sources, or of unknown origin. For these reasons it is considered that the identity of species at present accepted within the genus is open to question. Recommendation 5A, Rule 8 of the International Bacteriological Code of Nomenclature (Buchanan et al. 1948) states that "a special form (forma specialis) is a subdivision of a species of a parasitic micro-organism distinguished primarily by adaptation to a particular host". With the present information it appears that many of the species of Xanthomonas should be regarded as having the status of special forms if the recommendation in the Code is to be implemented. However, it would not be advisable to make proposals on this question until more information about host specificity has been obtained and examined.

McCulloch (1929) inoculated Bacterium phaseoli Smith, Bact. campestre (Pammel) Smith, and Bact. campestre var. armoraciae McCulloch into leaves of horse radish (Armoracia rusticana) with positive results. Miller et al., 1940, inoculated X. corylina and X. juglandis into half grown walnut fruits (Juglans regia). They reported successful infection with both organisms though the former was considerably less pathogenic than the latter. No attempt was made to find if passage through the host would change the result. Wernham (1948) inoculated cultures of fourteen pathogenic forms of Xanthomonas into twelve different hosts and found them to be "remarkably specific in their host reactions". He also stated that "there is no possibility of error in using the host as a species determiner". On the other hand, the writer has recently inoculated xanthomonad cultures originally isolated from twenty different hosts into immature leaves of bean (Phaseolus vulgaris) with positive results, and this finding, details of which will be published elsewhere, suggests that host specificity of the xanthomonads may not be a stable character.

It is obvious that further investigation is necessary to determine the host range and mechanism of pathogenicity of the xanthomonads in order to clarify the position of the many species now recognised as belonging to the genus Xanthomonas. It is suggested that before further organisms isolated from new hosts are given specific rank, consideration should be given to the possibility that they may be merely special forms of existing species. The present practice of forming a new species for a bacterial plant pathogen isolated from a new host, frequently without any comparative work, has already resulted in considerable synonymy.

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PYRENOMYCETES AT C.M.I.

Microfungi in general and Pyrenomycetes in particular have few taxonomic adherents. It was surprising, therefore, that over forty people gave up a Saturday morning to attend a demonstration of Pyrenomycetes in the C.M.I. herbarium on October 25th. This demonstration had been preceded by a day foray of the British Mycological Society on the previous Saturday, when Pyrenomycetes were collected in the field.

In the herbarium simple laboratory techniques for the isolation, culturing, and identification of these fungi were demonstrated. In one of the visitors' rooms a large number of examples of Pyrenomycetes illustrating the characters of many of the basic genera were available for microscopic examination. Although the demonstration was based on British material, it was encouraging to see a number of overseas students present, as the aim of the meeting was to illustrate to those interested, especially university students, something of the scope of modern taxonomy in relation to microfungi as studied in a working herbarium.

One important aspect of all taxonomic work is the preservation of material at all stages in the life history of the fungus and it was this part of the demonstration that roused most interest. The drying down of Petri dish and test tube cultures and the preservation of slide cultures were all carefully observed.

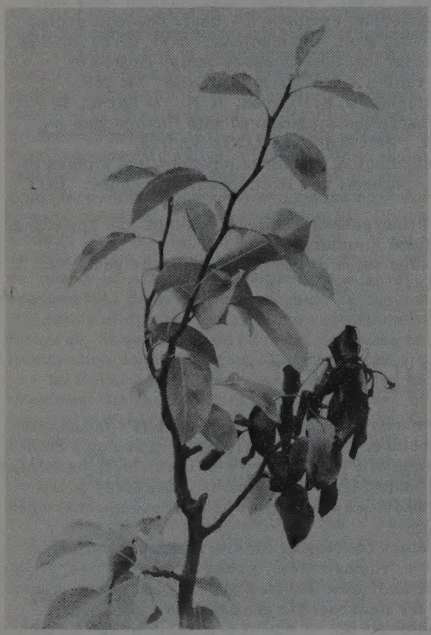
There is no need to dwell on the futility of trying to repeat taxonomic experiments in mycology when all the material on which the work was based has been destroyed. So if this demonstration has illustrated the ease with which such material could be preserved, and if it has encouraged University students and others to deposit their material at some central herbarium, then it will have served a useful purpose. It is further hoped that it will bring more people into the field of study of these interesting and important fungi. From this aspect it was unfortunate that there was no time to discuss individual mycological problems. Because of this, people who did not get their problems settled are invited to get in touch with the C.M.I. staff.

Thanks are due to Mrs. Sheila Francis of the Imperial College of Science and Technology for her enthusiastic assistance in the arrangements for the outing and demonstration.

C.B.

FIRE-BLIGHT OF PEAR IN BRITAIN

J.E. Crosse
East Malling Research Station



The infection has spread from a blossom on a lateral twig (right of the photograph) into a branch and two shoots. The leaves on the lateral twig are turning brown.

The presence of fire-blight of pear (Erwinia amylovora) has been confirmed in England during 1958. This appears to be the first authenticated record of the disease in Europe although there have been several previous reports of it from various continental countries. Fire-blight is indigenous to North America and probably occurred originally on wild hosts. There are descriptions of the disease dating back to the 18th century in the United States, where it is still a very serious problem, particularly in certain eastern States. It was introduced into New Zealand shortly after the first World War, and in the next 10 years or so spread to most orchard areas of that country.

Distribution in U.K.

The first signs of the disease in England were observed in the late summer and autumn of 1957 on five Kentish farms in the Maidstone, Rochester, and Wrotham areas. As a result of a survey carried out by the N.A.A.S. during 1958, a total of 12 cases have now been confirmed in Kent and 1 in the West Midlands. The disease has been outstandingly severe on the pear variety Laxton's Superb, nearly 80 per cent. of the trees in one orchard being killed or mutilated in 1957. During 1958 there was further spread of the disease in some affected orchards and many more trees of Laxton's Superb were destroyed.

The disease has been recorded on most of the commercial pear varieties, including Conference and Williams's Bon Chrétien, but apart from Laxton's Superb has been serious only on the little grown variety Fondante de Thiriott, which suffered severely in one orchard during 1958. Williams' (syn. Bartlett) has been little affected, although in North America this is one of the most susceptible varieties.

Symptoms

The disease follows the same pattern as described in the United States and elsewhere. Infection begins in the blossom and spreads rapidly into the branches, causing extensive cankers which may eventually kill the tree. The leaves on affected branches turn brown or black from the margins inwards, and the trees eventually appear as if they have been scorched by fire. Progress of the cankers is halted towards the end of the season and cracks appear at the margins of the diseased and healthy tissues. In some of these cankers bacteria were found to have

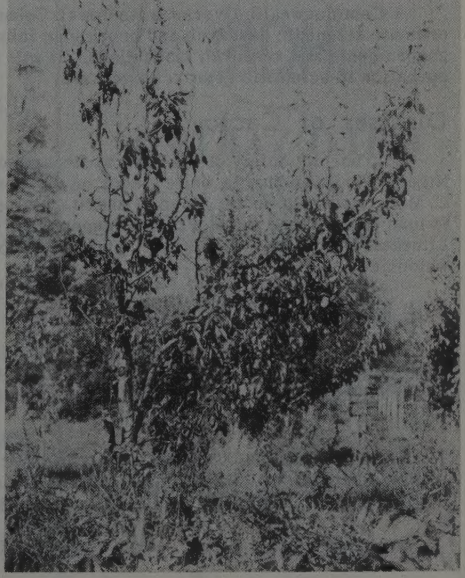
survived the winter of 1957-8 and these are believed to have been the source of fresh blossom infections in 1958. Shoots and fruits have also been attacked during the growing season. At first these were oily brown in colour, but later turned black in the same way as infected blossoms.

The bacterial nature of the disease has been fully confirmed by isolation and inoculation experiments in the laboratory and on field and glasshouse trees. Symptoms produced on fruits and shoots in the laboratory were indistinguishable from those described for Erwinia amylovora, the most characteristic feature being the production of bacterial ooze on the surface of infected tissues. Cankers resulting from wound inoculations of branches on a field tree of Laxton's Superb progressed at the rate of nearly an inch a day, and after 9 weeks the whole tree was almost completely destroyed. Apple and hawthorn shoots have been successfully infected in the labotatory, but no field infections have been recorded.

Identification

The pathogen has been identified as a species of Erwinia closely resembling E. amylovora in its biochemical characteristics. The identity of the two organisms is also supported by tests with bacteriophages isolated from soil beneath diseased trees. Thus amongst a range of Erwinia and coliform species so far tested, the phages have proved specific for the present pear isolates, and E. amylovora.

There is still no evidence to suggest that fire-blight in this country would ever reach serious proportions on pear varieties other than Laxton's Superb. Conference, for example, the most widely planted variety in Britain, has so far escaped virtually unscathed, even in orchards where a high proportion of Laxton's Superb trees have been destroyed. Nevertheless the potentialities of the present position are regarded as very grave, and a determined effort is to be made to check the further development of the disease by grubbing and destroying all infected trees during the winter of 1958-9. Legal powers for this are provided by the Fire-blight Disease Order, approved by Parliament under the Destructive Insects and Pests Act, on November 5th, 1958.



The final stages of the disease; two lateral branches were cut off earlier in the season, but too late to prevent the infection spreading into the trunk. The centre of the tree has been destroyed and only one branch, originating low down on the trunk, survives.

FROM NEAR AND FAR

During the first year of its activities under the Agricultural Research Act of 1956, by which it was made directly responsible to U.K. Parliament and not to the Treasury, the Agricultural Research Council expended £3,626,000 on research projects, involving nearly every university in England and Wales.

A start has been made by the U.K. National Committee of the British Commonwealth Collections of Microorganisms on the compilation of a new edition of the "Directory of Collections and List of Species maintained in the United Kingdom and Crown Colonies".

The newly formed British Lichen Society founded early in 1958 has published the first number of its journal THE LICHENOLOGIST. The honorary secretary is A.E. Wade, National Museum of Wales, Cardiff. Annual subscription, including journal, 20s.

A new biological test for gibberellic acid-like substances is described in ANN. BOT. N.S. 22: 297, 1958 by M. Radley, who has found such substances in various plant parts and in seeds.

A Symposium on Cultural and Metabolic Aspects of Moulds jointly between the Society for Applied Bacteriology and the Instituto di Sanita is proposed for 1960 in Rome. All workers are welcome. Particulars from G. Sykes, Boots Pure Drug Co., Microbiology Division, Standard Department, West Bridgford, Nottingham.

An international meeting on antibiotics will be held in Prague from 17-23 May 1959. Secretary is Dr. M. Hermanský, Antibiotics Research Institute, Roztoky, nr. Prague, Czechoslovakia.

F.C. Bawden has made a very interesting and useful review of virus diseases and viruses in his Amos Memorial Lecture published in the annual report of East Malling Research Station for 1957.

A Commonwealth Overseas Research Council is to be set up in U.K. to co-ordinate scientific research and provide an information centre for Commonwealth governments and research institutions. It will also advise Ministers on co-operation in scientific research overseas.

Diseases of Cacao

C. Thorold, lately of the Federal Department of Agricultural Research, Nigeria, is preparing to write a book on diseases of cocoa to be published by C.M.I. He would be very glad of assistance from colleagues who are in a position to loan photographs (or blocks) and supply information for inclusion in the book. Literature references to diseases of cocoa recorded locally will be especially welcome.

Publications of Interest

AN ESSAY ON UNIVERSITIES AND THE SCIENTIFIC REVOLUTION by Sir Eric Ashby. A delightful exposition of the development of science and technology in the universities of Great Britain and the continent. (London: Macmillan & Co., 1958. 15s. net)

For those interested in insect migration Dr. C.B. Williams has supplied another dissertation, INSECT MIGRATION, in the New Naturalist series (London: William Collins, 1958. pp. xiii + 235 + 24 plates. 30s. net.)

Dr. Mary Noble, C. de Tempe, and Paul Neergaard have collaborated in a

tremendous job of work to produce the ANNOTATED LIST OF SEED-BORNE DISEASES for the International Seed Testing Association. It has been checked by Herb. I.M.I. and arranged and published by the Institute. (163 pp., 1958, 20s.)

INSECT PESTS OF COTTON IN TROPICAL AFRICA, by E.A. Pearson, Director of the Commonwealth Institute of Entomology, contains notes on insect vectors of viruses and other plant pathogens, which are of considerable interest to plant pathologists. (London: Commonwealth Institute of Entomology. 40s.)

INVESTIGATION OF VIRUS DISEASES OF BRASSICA CROPS. L. Broadbent, A.R.C. Rep. Series No. 14, 1957. (vii + 94 + 8 illus. Cambridge University Press, 15s.)

AN INDEX TO THE LOCATION OF HERBARIA OF BRITISH VASCULAR PLANTS with Biographical Reference to their Collectors. D.H. Kent, E.B. Bargerter and J.E. Lousley. Lond. Botanical Society of the British Isles, c/o Department of Botany, British Museum (N.H.), 1957. (101 pp. 20s.)

ANNUAL REVIEW OF MICROBIOLOGY, vol. 11. Edited by Charles E. Clifton, Sidney Raffel and Roger Y. Stanier. Palo Alto, Cal. Annual Reviews Inc. 1957. $7. (viii + 536 pp.) Contains reviews of problems in plant virus studies and prediction of plant disease epidemics, as well as a survey of progress in soil microbiology.

PLANT CLASSIFICATION, Benson. London, Geo. Harrap, 1957. (xiv + 688 pp. 63s.) Comprehensive textbook on American flora. Contains useful account of methods of collection and preparation of material.

MICRO-ORGANISMS IN THE SOIL, Burges. Hutchinson & Co., London, 1958. (188 pp. 10s. 6d.)

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PERSONAL NEWS

C.M.I. News

A party of about 30 members of the London Branch of the Institute of Biology, led by Dr. K. Mellanby of Rothamsted, visited the Institute in October. The Director showed a number of transparencies of tropical plant diseases as an introduction to displays in the Herbarium and Culture Collection. The mysteries of the editorial section were also partly disclosed.

The Executive Council of the C.A.B. held their November meeting at the Institute and were shown the work in progress.

Visitors

Among overseas visitors have been Professor A.C. Batista, Brazil; Dr. H.C. Govindu, India; Professor E. Khabiri, Iran; Professor W.J. Lüjeharms, S. Africa; Anthony Johnston and Dr. A. Newsam, Malaya; J.A. Spence, Trinidad; P.E. Udeya, Nigeria; Emeritus Professor Sir Samuel Wadham, Australia; and Dr. H. Yamato, Japan.

Appointments, Promotions, Retirements, etc.

The Overseas Service Division of the Colonial Office announce the following: D.L. Downie, deputy director, W.A.I.F.O.R., Nigeria; D.H. Drennan, assistant director of agriculture, Tanganyika; A.P.S. Forbes, director of agriculture, Tanganyika; H. Irving, principal research officer, N. Nigeria; R.W.J. Keay, assistant director of forest research, Nigeria; L.T.S. Littlejohn, deputy director of agriculture, Tanganyika, and H. Paul, assistant director of agriculture (research), British Guiana.

Dr. J.G. Malloch M.B.E. (Canada) and A. Perera (Ceylon) have been appointed chairman and vice-chairman, respectively, and W.G. Alexander, C.B.E. (U.K.), E.J. Drake (Australia), J.D. de Silva (Malaya), and J.E. Sagoe (Ghana), members of the Executive Council of the C.A.B.

F.C. Bawden F.R.S. has been appointed consultant director of the Commonwealth Bureau of Soils, Rothamsted, on the retirement of Sir William Ogg.

Professor G. Pontecorvo has been elected to the Council of the Royal Society of Edinburgh for 1958-9.

Dr. M.L.M. Salgado has been appointed director of the Coconut Research Institute, Ceylon.

Professor W.O. James F.R.S. of the University of Oxford has been appointed to the chair of botany at the Imperial College of Science and Technology, London, in succession to Dr. P.H. Gregory, who has taken up his duties as head of the Plant Pathology Department at Rothamsted.

Anthony Johnston, lately senior plant pathologist, Malaya, has now gone to Bankok as regional plant protection officer of the Plant Protection Committee for S.E. Asia and the Pacific Region.

(continued on p. 15)

OVERSEAS NEWS

CANADA

BIG VEIN OF LETTUCE

by C. D. McKeen

Big vein, a disease known to occur in many of the vegetable growing areas of the United States and also in Europe, was observed in the spring of 1958 in the head lettuce crop in Essex County, Ontario. Characteristic symptoms of the disease were evident. In some fields 60 per cent. of the plants were affected and the crop headed very unevenly. A few growers observed abnormalities in their crops in late April and in early May, just before heading commenced. It is thought that the abnormally cool spring provided conditions favourable for disease expression.

For many years big vein was considered to be caused by a soil-borne virus. However, recently Grogan et al. (PHYTOPATHOLOGY, 48: 292-297, 1958) presented evidence that an Olpidium is associated with the disease. In this Ontario outbreak no attempt was made to determine whether the roots of affected plants were invaded by Olpidium.

PROGRESSIVE DEVELOPMENT OF WINTER CROWN ROT OF ALFALFA

by J. B. Lebeau

In previous studies in Alberta it was demonstrated that the winter crown rot pathogen (an unidentified low-temperature basidiomycete) synthesizes hydrogen cyanide, which becomes absorbed by the host. Because the quantities absorbed were proportional to the amount of damage to the affected plants it was decided to make use of this fact in a study of the etiology of the disease. Random samples of about 50 plants each were removed from plots of inoculated alfalfa at two-week intervals from September to April. The crown buds were removed from the plants immediately and their HCN content determined. The data revealed high activity of the pathogen beneath the snow during the winter months, particularly in February and March (Table 1). The high HCN content built up in the tissues during these two months was, however, rapidly dissipated when the temperature rose in April.

Table 1. Concentration of HCN recovered from crown buds of alfalfa inoculated with the low-temperature basidiomycete on October 8

Date of sampling	Concentration of HCN p.p.m.	Average of maximum and minimum air temperatures for two-week period prior to sampling date °C
Dec. 1	0	2
Dec. 17	3	-18
Jan. 2	0	- 2
Jan. 15	1	-16
Feb. 1	100	-13
Feb. 15	60	-10
March 1	86	-14
March 15	500	-11
April 1	220	0
April 15	42	- 1
May 1	0	9

Studies were also made to determine the importance of the fall season in the establishment of the disease. Alfalfa plants were inoculated in the field at two-week intervals from mid-September to mid-November and rated for survival in early June of the following year. The greatest damage occurred in plants inoculated in early October, but no disease was evident in the plots where the plants were inoculated in the middle of November for the three consecutive years that the experiment was conducted. Although histological examination showed that no infection occurred in the fall, it is evident from these results that the inoculum must be present during the period from October 1 to November 15 if the fungus is to establish parasitic relations with the host.

Snow mould has generally been considered to be a disease that develops in the spring and, no doubt, this popular concept is based on the luxuriant growth of the fungus on the surface of the ground at this season of the year. The pathogen, however, is probably harmless during this period because the host does not absorb and retain the HCN synthesized by the fungus when the temperatures are much above the freezing point. The critical period from October to November would appear to be the logical time to attempt control, because chemicals or cultural practices that would hinder the establishment of the pathogen at that time should prevent development of the disease.

This investigation has shown that pathogenesis occurs when least suspected because of the unfavourable temperatures for growth of the low-temperature basidiomycete. Other pathogens may also be destructive to winter cereals and perennial forage crops in that same period, even though their optimum temperature for development is considered to be higher.

OBITUARY

The death of Dr. Kenneth W. Neatby, Director of Science Service, Canada Department of Agriculture, in a Montreal hospital on the 27th October, 1958, will come as a great shock to his many firends in agriculture, not only in Canada but also in the United States, Great Britain and in many parts of the Commonwealth. Born in England in 1900, he grew up on a Saskatchewan farm. Upon receipt of his M.S.A. at the University of Saskatchewan, he joined in 1926 the staff of the newly formed Rust Research Laboratory at Winnipeg, where as a cereal specialist he engaged in studies on the inheritance of stem-rust resistance in wheat and in breeding some of the first resistant wheat varieties in Canada. In 1931 he was awarded his Ph.D. at the University of Minnesota. From 1935 to 1940 he was head of the Department of Field Crops, University of Alberta, and from 1940 to 1945 director of the Line Elevators Farm Service, a commercially-sponsored extension service to prairie farmers. In 1946 he was invited to Ottawa to succeed Dr. J.M. Swaine, first Director of Science Service. Under his leadership, basic research in agriculture was greatly expanded. Important new laboratories were built and staffed and old centres were greatly strengthened. To advance further agricultural research in Canada, Dr. Neatby was the leading spirit in recent months in developing a plan for the amalgamation of Science Service and Experimental Farms Service into a single research organization. Kenneth Neatby will be remembered for his warm personality, his love of life and his great intellectual gifts from which he gave freely in the interests of agriculture.

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INDIA

The 3rd All India Mycological Workers' Conference was held at Simla from 19 to 23 June, 1958. Delegates from various parts of the country representing various research and educational institutions participated in the deliberations.

Progress of research made during the past ten years was reviewed, shortcomings discussed, and certain important problems were pinpointed.

A number of other plant pathological topics were discussed and several resolutions passed, among which were research with a view to instituting a disease forecasting service, production of disease-free seed, particularly for vegetatively propagated field and horticultural crops, introduction of inter-state plant quarantines, intensification of plant virus and bacteriological research with reference to diseases of fruits and vegetables, diseases in storage and transit of farm produce, and intensifying research on direct methods of plant disease control.

In another resolution, increased facilities for the teaching of mycology and plant pathology in the State Agricultural Colleges and Science Colleges, and the creation of Chairs in mycology at the universities were recommended.

Bacteriophages

A phage specific to Xanthomonas citri, the causal agent of citrus canker, was isolated at the Indian Agricultural Research Institute from diseased leaves of citrus and also from soil samples taken from beneath the affected trees. Some studies on the properties of the phage have been made, and X. citri has been shown to be lysogenic.

An antibiotic from B. subtilis

"Bulbiformin", an antibiotic produced by Bacillus subtilis at the I.A.R.I. has been shown to be antifungal and antiviral in nature. Further studies on the factors governing its production in soil have shown that the addition of molasses along with roots of some leguminous crops or mustard cake considerably enhances the production of the antibiotic.

Safflower rust

Work done at the I.A.R.I. has shown that Puccinia carthami is heterothallic and the presence of uredinoid aecia has been observed, indicating the possibilities of the production of new physiologic races by hybridization.

R.S. Vasudeva

BLACK LEG OF BEET (Beta vulgaris)

Phoma betae, the principle cause of black leg of Beta was reported by Björling (BOT. NOT. ser. 218, 1944) to be the pycnidial state of a Pleospora which he called called Pleospora betae.

Dr. C.E. Cornford working at Dunholme Field Station, Lincoln, in 1956, found a similar Pleospora on wild beet. The ascospores from several of these collections were isolated at the C.M.I. and produced pycnidia of Phoma betae. Isolations of Phoma betae from sugar beet seedlings were also grown for comparison and these were found to be identical. Dr. Cornford reported that the perithecia were abundant on wild beet during the winter of 1956. As these findings confirm Björling's work in Sweden future references in the REVIEW OF APPLIED MYCOLOGY to Phoma betae Frank will be under Pleospora betae Björling.

AFRICA

Kenya

OPENING OF NEW LABORATORIES

THE PLANT BREEDING STATION, NJORO

by H.C. Thorpe
Senior Plant Breeder, Department of Agriculture

On August 29, 1958, the new research laboratories of the Plant Breeding Station of the Department of Agriculture were formally opened by the Hon. Sir Ferdinand Cavendish-Bentinck C.M.G., Speaker of the Legislative Council. This marks a new stage in the expanded programme of work made possible by the provision of extra funds to intensify the production of rust-resistant wheats. The

Sir Ferdinand Cavendish-Bentick, C.M.G., delivering his Opening Address. L. to R. The Director of Agriculture, the Hon. R.J.M. Swynnerton, O.B.E., M.C., The Senior Plant Breeder, Mr. H.C. Thorpe

Station, 400 acres in area, is situated on the Equator at 7,100 feet, in one of the main wheat growing areas of the Kenya Highlands. Although wheat breeding has absolute priority owing to the constant pressure of rust attack work also continues on maize, barley, and oats. Much use is also made of other departmental stations to cover the needs of the wide range of ecological conditions in the country. The staff of the Section consists of 8 graduate officers and appropriate supporting staff. Monies necessary to finance the various projects are derived from three sources, namely, Colony funds, the Development Plan and, more recently, from a cess on the wheat crop agreed by the producers themselves — a particularly encouraging move.

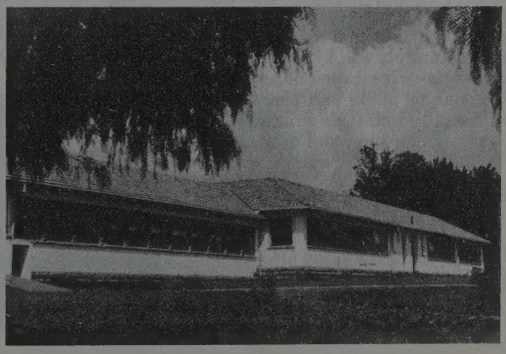
In the progeny plots. L. to R. - K. Lynch, G.E. Dixon, H.C. Thorpe, F.F. Pinto.

The Rust Problem

Cultivation of wheat in the Kenya Highlands is rendered difficult by the attacks of various diseases, the most important of which are the rusts, particularly black stem rust, attacks of which have been particularly severe over the past few seasons and losses suffered by farmers have been heavy. In fact, black stem rust is the most serious factor limiting wheat yields and it therefore has complete priority in the breeding programme. At the time the Station was established in 1928 two physiologic races were identified and designated K1 and K2. Since this time new races have arisen at intervals and up to date 19 different races have been identified, 11 of these since 1948. This acceleration in the occurrence of new races of black stem rust has led to the abandonment not only of many of the old established wheat varieties but also of much material in various stages of development; it has thus placed a very severe strain on the breeding work in recent years. In retrospect, it is seen that this material from the old programme was far too interbred and hence lacked breadth of resistance.

Breeding and Pathology

In 1950, a greatly expanded crossing programme was initiated to introduce more foreign blood and so build up a range of varieties on a broader genetical basis. The work was further expanded in 1953 when collaboration began with the International and F.A.O. Wheat Rust Nurseries. These nurseries offer an unsurpassed range of new breeding material and new sources of rust resistance. In fact, the crossing programme since 1955 has been based almost entirely upon varieties extracted from these nurseries; furthermore, a number of these varieties have reached an advanced stage of multiplication for direct release to farmers. In addition to broadening the genetic basis of the work, other important lines which are being developed include speeding up the growth of breeding material by



A wing of the new Research Laboratories

the use of supplemental lighting to achieve several generations in a single year, study of the multiline concept of "composite synthetics", and the utilisation of derivatives from other species and genera. The programme also covers, but to a lesser extent, search for new sources of rust resistance in irradiated material, and investigation into the economics of rust control by chemical sprays. A study of the life history of stem rust in East Africa, with special reference to epidemiology, is of fundamental importance to the breeding programme and, apart from routine tests, forms the main work of the pathology section. Of special interest at the moment is the question of integrating the rust testing with the International System; this would then bring rust work in Kenya closer to that in other countries. Although work has been confined almost entirely to wheat stem rust a programme to study other cereal rusts, particularly stripe rust of wheat, and crown and stem rusts of oats, will be developed as soon as funds are provided.

The Future

Although maize breeding is one of the tasks of the Section, progress in the past has been hampered by lack of finance and the prior attention required by wheat. Nevertheless, some expansion of effort has recently been achieved, and this important project will be fully developed as soon as special funds can be obtained for the purpose.

In general it may be said that the modern facilities already provided, increase of staff, injection of extra capital and, not least, the more direct interest being taken by the Industry itself, have all given a great impetus to the effort to develop new and better cereal varieties for Kenya.

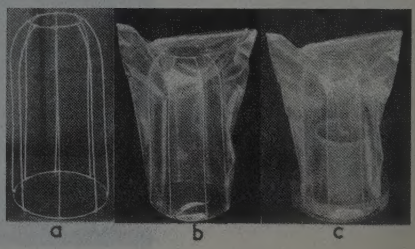
A SIMPLE PLASTIC BELL-JAR

by C.S. Venkata Ram and K.S. Venkataramani,
UPASI Tea Experiment Station, Devarshola, The Nilgiris, South India

The prohibitive cost of the glass bell-jar, at the moment, and the difficulty experienced in obtaining requirements for mycological work prompted us to devise a suitable substitute.

Polythene film, because of its qualities of retaining moisture while transmitting light and permitting gaseous exchange, suggested itself as a substitute for glass. Polythene tubes (100 and 150 gauge I.C.I. 'alkathene') were cut to the required length and heat-sealed at one end. To support these bags in a vertical position, cages made of stiff galvanised iron wire were employed (fig. a). The open end of the polythene tube was held in position by means of a rubber band or by heat-sealing it to the lower ring of the wire-cage (fig. b). These improvised polythene-wire cages were used essentially in the same manner as glass bell-jars with satisfactory results (fig. c).

The advantages of the polythene-wire cages over the conventional bell-jars are: (i) polythene permits gaseous exchange while retaining moisture and, therefore, a polythene-wire cage is more suitable than a glass bell-jar for maintaining growing plants in a humid chamber, (ii) these cages cost very little to make, approximately Rs. 1/50, i.e., 2 sh. per cage, 14" × 7", (iii) a large number of polythene-wire cages of any required size can be made in a short time with easily obtainable material and (iv) they are light and unbreakable.



The bell-jar in construction and use

(continued from p. 8)

Dr. A. F. Posnette has been appointed head and Dr. J. E. Crosse deputy head, respectively, of the Department of Plant Pathology at East Malling Research Station. Dr. R. V. Harris, the retiring head, has taken up a full time appointment as advisor to the director.

Dr. K. Wilson has been appointed as reader in botany at Birkbeck College, London.

Dr. Janet Graham has been appointed lecturer in botany at Birmingham University.

Dr. A. Perry has left Rothamsted to study Fusarium wilt of cotton with the Empire Cotton Growing Corporation in Uganda and Tanganyika and Dr. G. A. Salt has gone to the Sudan for two years also to study cotton diseases.

Awards

The Darwin Medal of the Royal Society has been awarded to Sir Gavin de Beer, director of the British Museum (N. H.), for his work on evolution.

The first V. H. Blackman Post-graduate Research studentship at East Malling Research Station has been awarded to M. G. Morris (Cambridge) for research in applied entomology.

Dr. W. B. Kendrick of Liverpool has been awarded a Post-doctorate Fellowship under the N. R. C. of Canada to work with Dr. S. J. Hughes at Ottawa.

Post-graduate research studentships for botanical ecological research have been awarded by the National Conservancy of Great Britain to J. M. Bradbeer (Southampton), D. Briggs (Durham), T. T. Elkington (Durham), P. J. Myerscough and J. G. B. Newbold (Oxford), and B. M. Stephens (University College of North Wales, Bangor).

CHROMATOGRAPHY AND TAXONOMY

At a symposium on chromatography and taxonomy held by the Linnean Society, London, on November 20 the information gained by chromatographic analysis was compared with the current orthodox classification of the groups under discussion.

The papers by Dr. E. C. Bate-Smith on phenolic compounds in the Rosaceae, Dr. J. B. Harborne on flower pigments, and Drs. A. T. R. Mattick and N. J. Berridge on the differentiation of closely related bacteria were of particular interest to the mycologist.

It was apparent from this symposium that the biochemical techniques involved have now been developed to a stage where they can produce evidence, from a totally different aspect, that can be used to support conclusions based on morphology or cultural work. Dr. Berridge demonstrated that when used purely for comparative purposes a simple procedure can be adopted and that this will give results in a comparatively short time. These results were remarkably constant for the heterofermentive lactobacilli under discussion and provided a simple method of identification.

There are, of course, numerous difficulties or pitfalls to be avoided, thus Dr. Harborne showed that different pigments were present in different parts of the same plant and Dr. Berridge demonstrated the different components present in bacterial cultures of different ages. To overcome the latter it was necessary to

grow the cultures under standard conditions and take samples at a given age.

Simple methods of extraction and of running the chromatogram make its use for determining known but non-sporulating fungi in culture a definite possibility. It may even provide a means of separating morphologically indentical fungi which have different physiological properties. It appears, therefore, that there is a need for close collaboration between the biochemist and the taxonomist to work out chromatograms for the important fungi and thus build up a series of chromatogram patterns for genera and families.

Dr. Berridge's papers will appear in the JOURNAL OF APPLIED BIOLOGY and the JOURNAL OF DAIRYING RESEARCH.

C.B.

PUBLICATIONS OF THE COMMONWEALTH MYCOLOGICAL INSTITUTE

Recently Issued

AN ANNOTATED LIST OF SEED-BORNE DISEASES with extensive literature references, by Mary Noble, J. de Tempe, and Paul Neergaard. 164 pp. Published in collaboration with the International Seed Testing Association.

PRICE, postage paid, 20s.

CLUB ROOT OF CRUCIFERS CAUSED BY PLASMODIOPHORA BRASSICAE by John Colhoun. A monograph on a classical disease invaluable to teachers and research workers. (Phytopathological Paper No. 3. 108 pp. + 4 plates. Bibliography of 11 pages).

PRICE, postage paid, 20s.

MYCOLOGICAL PAPERS

No. 65. SOME SPECIES OF CORYNESPORA. By M.B. Ellis. 15 pp., 8 figs., 1956. 6s.

No. 66. SOME SPECIES OF DEIGHTONIELLA. By M.B. Ellis. 12 pp., 6 figs., 1957. 5s.

No. 67. HAPLOBASIDION, LACELLINOPSIS, AND LASCELLINA. By M.B. Ellis. 15 pp., 9 figs., 1957. 6s.

No. 68. STUDIES OF PYRENOMYCETES: I. FOUR SPECIES OF CHAETOSPHAERIA, TWO WITH CATENULARIA CONIDIA. II. MELANOPSAMMA POMIFORMIS AND ITS STACHYBOTRYS CONIDIA. By C. Booth. 27 pp., 7 figs., 1957. 9s.

No. 69. SOME SPECIES OF TERATOSPERMA. By M.B. Ellis. 7 pp., 5 figs., 1957. 3s.

No. 70. CLASTEROSPORIUM AND SOME ALLIED DEMATIACEAE — PHRAGMOSPORAE. I. By M.B. Ellis. 89 pp., 63 figs., 1958. 30s.

In preparation for publication next Spring ————

Clasterosporium and some allied Dematiaceae. Pt. II by M.B. Ellis, also studies on Nectria by C. Booth and Cercosporeae of Sierra Leone by F.C. Deighton.

Substantial discount is also given for orders of all "Mycological Papers".

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